

Appl. No.10/762,599

Paper dated: July 6, 2006 July 6, 2006

Reply to Office Action dated April 6, 2006

Amendments to the Claims:

This listing of claims will replace all prior listings of claims in the application.

Listing Of Claims:

Claim 1 (currently amended): A method of for detecting disposition of a plurality of ~~exposure~~ shot areas on ~~of~~ an object, the plurality of shot areas being exposed to a pattern in accordance with the detected disposition ~~that is to be exposed~~, said method comprising:

a first detection step of detecting an ~~the~~ alignment mark in the plurality of shot areas, the alignment mark including elements that have an interval therebetween ~~marks on the object~~;

an evaluation step of evaluating reproducibility of the interval of the detected alignment mark ~~randomness of the alignment marks based on the detection result by said first detection~~ step;

a determination step of determining a number ~~smaller than the total number~~ of alignment marks in the plurality of shot areas ~~on the object~~ based on the evaluated reproducibility ~~evaluation result by said evaluation step~~; and

a second detection step of detecting the disposition of the plurality of ~~exposure~~ shot areas by detecting a plurality of alignment marks in the plurality of shot areas, a number of the plurality of alignment marks having been determined ~~corresponding to the number determined~~ by said determination step.

Claim 2 (canceled).

Claim 3 (canceled).

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Claim 4 (currently amended): A method according to claim 1 ~~[[3]]~~, wherein said determination step determines, as the number of alignment marks, a minimum natural number N_s that satisfies ~~meets~~ $N_s = \alpha \cdot (Mr/Ar)^2/N_m$, where Mr is the reproducibility of the interval between the mark elements, N_m is a the number of the mark elements included in the each alignment mark, Ar is required alignment accuracy, and α ~~($1 \leq \alpha \leq 3$)~~ is a corrective coefficient that is not smaller than 1 and not greater than 3.

Claim 5 (currently amended): A method according to claim 1 ~~[[3]]~~, wherein said determination step determines, as the number of alignment marks, a minimum natural number N_s that satisfies ~~meets~~ $N_s \geq \alpha \cdot f(N_m, Mr, Ar)$, where Mr is the reproducibility of the interval between the mark elements, N_m is a the number of the mark elements included in the each alignment mark, Ar is required alignment accuracy, α ~~($1 \leq \alpha \leq 3$)~~ is a corrective coefficient that is not smaller than 1 and not greater than 3, and $f(N_m, Mr, Ar)$ represents a function of N_m , Mr and Ar ~~f is a predetermined function~~.

Claim 6 (currently amended): A method according to claim 1, ~~wherein the alignment mark includes plural mark elements, and~~
 wherein said evaluation step evaluates the reproducibility based on a standard deviation of a plurality of the interval of a plurality of the detected alignment mark ~~includes the steps of:~~

~~calculating a difference between an average among measurement values of positions of all the mark elements, and the measurement value of the position of the mark element; and~~

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~~calculating reproducibility of the difference.~~

Claim 7 (currently amended): An apparatus for detecting disposition ~~dispositions~~ of a plurality of ~~exposure~~ shot areas on ~~of~~ an object, the plurality of shot areas being exposed to a pattern in accordance with the detected disposition that is to be exposed, said apparatus comprising:

a detector configured to detect ~~for detecting the~~ alignment mark in the plurality of shot areas, the alignment mark including elements that have an interval therebetween marks on the object;

a processor configured to evaluate reproducibility of the interval of the detected alignment mark, for evaluating randomness of the alignment marks based on the detection result by said detector;

to determine a controller for determining a number smaller than the total number of alignment marks in the plurality of shot areas on the object based on the evaluated reproducibility, evaluation result by said processor; and

to cause said detector to detect the determined number of a second detector for detecting the dispositions of the plurality of exposure shot areas by detecting alignment marks in the plurality of shot areas, and to detect the disposition of the plurality of shot areas based on the detection of the determined number of alignment marks corresponding to the number determined by the controller.

Claim 8 (canceled).

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Claim 9 (currently amended): An exposure apparatus for exposing an object to a pattern, said apparatus comprising: the apparatus according to claim 8.

an apparatus as defined in claim 7 for detecting disposition of a plurality of shot areas on the object.

Claim 10 (canceled).

Claim 11 (canceled).

Claim 12 (new) A method of inspecting an overlay state between a first mark and a second mark in each of a plurality of shot areas on an object, a film being formed on the first mark, the second mark formed on the film, each of the plurality of shot areas having been formed through an exposure of the object to a pattern, said method comprising:

a first detection step of detecting the first mark in the plurality of shot areas, the first mark including elements that have an interval therebetween;

an evaluation step of evaluating reproducibility of the interval of the detected first mark;

a determination step of determining based on the evaluated reproducibility of the plurality of shot areas with respect to each of which the overlay state is to be inspected; and

a second detection step of detecting the overlay state in each of the plurality of shot areas, a number of which having been determined by said determination step.

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Claim 13 (new) An apparatus for inspecting an overlay state between a first mark and a second mark in each of a plurality of shot areas on an object, a film being formed on the first mark, the second mark formed on the film, each of the plurality of shot areas having been formed through an exposure of the object to a pattern, said apparatus comprising:

a detector configured to detect the first mark in the plurality of shot areas, the first mark including elements that have an interval therebetween;

a processor configured to evaluate reproducibility of the interval of the detected first mark, to determine, based on the evaluated reproducibility, a number of the plurality of shot areas with respect to each of which the overlay state is to be inspected, to cause said detector to detect the first mark and the second mark in each of the determined number of shot area, and to detect the overlay state with respect to each of the determined number of shot areas based on the detection of the first mark and the second mark in each of the determined number of shot areas.